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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD L. COULSON

Appeal 2008-0682
Application 09/981,620
Technology Center 2100

Decided: June 16, 2008

Before JAMES D. THOMAS, LANCE LEONARD BARRY, and
ST. JOHN COURTENAY III, *Administrative Patent Judges*.

THOMAS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 107, 109 through 126, 128 through 137, and 139 through 148. We have jurisdiction under 35 U.S.C. § 6(b).

As best representative of the disclosed and claimed invention, independent claim 107 is reproduced below:

107. An apparatus comprising:

non-volatile cache memory; and

a controller to control access to a rotating storage device in response to requests, the controller to spin down the rotating storage device, to queue one or more operations for the rotating storage device, to spin up the rotating storage device to perform a read operation for a read request in response to a miss in non-volatile cache memory for the read request, and to perform one or more queued operations for the rotating storage device in response to the miss,

wherein the controller is to queue one or more operations for the rotating storage device while the rotating storage device is spun down.

The following references are relied on by the Examiner:

Cohn GB 2,286,267 Sept. 8, 1995
IBM Technical Disclosure Bulletin NN9411421, Nov. 1, 1994

In a first stated rejection under 35 U.S.C. § 102(b) the Examiner relies upon Cohn as to claims 107, 109, 110, 115, 118, 122 through 126, 128, 129, 134, 137, 139, 140, 145, and 148. In a second stated rejection, the Examiner relies upon Cohn in view of Office Notice to reject claims 111 through 114, 119 through 121, 130 through 133, and 141 through 144 under 35 U.S.C. § 103. Lastly, in a third stated rejection, the Examiner relies upon Cohn in view of the IBM TDB as to claims 116, 117, 135, 136, 146, and 147.

Rather than repeat the positions of the Appellant and the Examiner, reference is made to the Brief and Reply Brief for the Appellant's positions, and to the Answer for the Examiner's positions.

OPINION

For the reasons set forth by the Examiner in the Answer, we sustain each of the three separately stated rejections and, therefore, we affirm these rejections.

With respect to the first stated rejection of various claims under 35 U.S.C. § 102, Appellant argues independent claims 107, 126, and 137 collectively as to common features recited in these claims.

We fully agree with the Examiner's observations expressed at page 10 of the Answer with respect to the teachings of Cohn's cache replacement mechanism discussed at the bottom of page 10 this reference:

[it] is clear that the Examiner is not equating Cohn's designating of sectors as new with queuing operations. Rather the Examiner is equating the replacement or storing of items in the cache until they can be written to disk with the claimed queuing operations. Clearly a status is not an operation, and the Examiner had never asserted such. It is also clear that storing data in the cache when the disk is spun down and making that data as "new" so it will be written to disk later when the disk is eventually spun up is a queuing operation and meets the language of the claims.

On page 6 [of the Brief], first full paragraph, Applicant argues that "arranging of sectors in a Destaging Order as taught by Cohn cannot be equated with queuing any operations." The Examiner agrees, but the Examiner had never asserted otherwise. It was and is the Examiner's position that storing data in the cache when the disk is spun down and marking that data as "new" so it will be written to disk later when the disk is eventually spun up is a queuing operation and meets the language of the claims. Cohn doesn't explicitly use the word "queuing" for this storing of data in the cache, but Cohn's disclosure meets the broadly claimed function of queuing since queuing just means holding something until later and Cohn's device clearly holds the data in the cache until it can be written to the disk later when the disk is spun up.

In the context of the actual arguments presented at pages 4 through 6 of Brief, Appellant's basic position is that Cohn does not teach queuing one or more operations while the rotating storage device is spun down. There is no dispute before us that the reference teaches spin up and spin down conditions for rotating storage devices. The Examiner's essential position quoted above associated with the so-called replacement operations indicates the Examiner's interpretation, with which we fully agree, that the cache memory 106 and the associated control system 108 within the cache system 102 in figure 1 of Cohn essentially store the data as well as the operation upon it, that is, a storing or write operation in the cache during a spin down condition of the claimed rotating storage device. In response to the Examiner's position in the Answer, apparently at page 11, Appellant's various remarks at the bottom of page 1 of the Reply Brief insist that such memory operations are not performed in Cohn. To the extent these remarks of Appellant's may be construed as asserting that a queue is required in represented independent claim 107 on appeal, no structural queue is claimed per se (or disclosed for that matter) in the independent claims on appeal, just the functionality of queuing by the claimed controller.

On the other hand, Appellant acknowledges at the top of page 3 of the Reply Brief that various portions relied upon by the Examiner in Cohn to justify the rejection, "while they teach storage of data to the cache memory, nothing here or anywhere else in Cohn teaches queuing of memory operations." While essentially admitting that reference teaches storage or writing or queuing of data to a cache memory, we do not agree with the assessment that Appellant indicates here - that no queuing operation per se

(as opposed to queuing mere data) is taught or indicated to the artisan within the teachings of Cohn. From our perspective, even from the abstract of this reference, Cohn's cache replacement mechanism is said to perform data transfers between a cache memory and the actual storage element or disk 104 only while the storage element is at operating speed after such a read or write request has given rise to an access to this storage element. The artisan would well appreciate from this assessment alone that the read/write functions or requests within Cohn at a time that the disk is not at an operating speed would be stored. The requests themselves for these read and write operations are not stated in the reference to be lost during the time from a standby or spin down circumstance of the disk to an active status as disclosed at page 6 of this reference or during the time in a standby mode when it is in a spin down state alone. We are therefore persuaded by the Examiner's reasoning in the Answer that the artisan would understand the operability of Cohn's device to be consistent with the Examiner's positions.

As to the second stated rejection of various claims under 35 U.S.C. § 103, Appellant presents common arguments for the corresponding features only as to claims 111, 130, and 141 at pages 6 and 7 of the principal Brief on appeal. These claims recite that the previously recited queuing operation in the respective parent independent claims comprises itself a prefetch operation. In addition to the Examiner's statement of the rejection at pages 6 and 7 of the Answer relying upon Official Notice as to the function of prefetching (this function has not been contested during prosecution by Appellant to not have been within the Official Notice assertion of the

Examiner), we also agree with the Examiner's views expressed at page 12 of the Answer in the responsive arguments portion. We reproduce those remarks here:

Since Cohn's device includes queuing of memory operations (namely write operations) and performing queued operations in response to a miss (one the disk is spun up to satisfy a miss, the queue operations are destaged or written to the disk), and since it would have been obvious to implement prefetching in Cohn's device, it would also have been obvious to queue the prefetch operations and to perform queued operations in response to a miss. Applicant presents no evidence whatsoever why this wouldn't be obvious.

In fact, since it would have been obvious to include prefetching and since Cohn's device already performs queuing, it would have been obvious to queue the prefetch operations as well as the write operations. Prefetches are early requests for data that isn't needed yet and therefore prefetches are "low priority" or "low need" requests. The lack of need for a prefetch to be satisfied immediately means the disk would not need to be spun up immediately after a prefetch is requested. Cohn teaches that to save power, the only reasons his disk is spun up is to satisfy a miss – a request that cannot be satisfied from the cache. Therefore, since prefetches have such low priority, they can be queued and satisfied or performed later when the disk is spun up for satisfying a miss. So it would have been obvious to one of ordinary skill in the art at the time the invention was made to queue up the prefetch operations and perform them later when the disk is spun up to minimize the number of disk activations and thereby save the most amount of power (Cohn's chief goal).

As to this issue of prefetching alone, Appellant admits that it was known in the art at the bottom of page 1 of the Specification, as filed. Additionally, the discussion in the paragraph bridging pages 2 and 3 of Cohn appears to have included a discussion in different words of the prefetch functionality claimed.

The discussion at page 3 of the Reply Brief admits that prefetching was known in the art. Appellant continues by explaining that Cohn “simply teaches that the data is stored in a cache memory when an associated disk drive is not powered up.” In addition to admitting that Cohn teaches the storing of data per se in his cache memory when the associated disk is not powered up, that is, in a spin down condition as claimed, Appellant recognizes that this data is stored in the cache memory in association with a write operation, that is, a store operation. This essentially is the same argument as presented earlier with respect to the rejection of the parent independent claims under 35 U.S.C. § 102. The Examiner’s reasoning in the Answer at least to the extent we have quoted earlier is persuasive of the artisan’s appreciation of the teachings of Cohn as to the storing of data in the cache memory in a spin down state as well as the storing of the associated operation, that is, at least a write operation when the associated disk is not powered up. The operation or command to write has to be cached in a spin down condition along with the data to be written or both would be lost.

Since Appellant’s remarks with respect to the second stated rejection were limited in the discussion at pages 6 and 7 of the principal Brief on appeal to claims 111, 130, and 141, we will not entertain any arguments with respect to the other claims listed at the bottom of page 3 of the Reply Brief. Any arguments that could have been made with respect to these other dependent claims within this rejection have been waived since they were not argued in the Principal Brief.

Lastly, we sustain as well the third stated rejection of other dependent claims for the reasons set forth by the Examiner in the Answer. The Examiner correctly observes at the bottom of page 12 of the Answer that Appellant has presented no arguments as to this stated rejection and none are presented as well in the Reply Brief. Appellant is urging patentability at page 7 of the principal Brief on appeal based upon the same arguments presented with respect to their parent independent claims within the first stated rejection we have addressed earlier.

In view of the foregoing, the decision of the Examiner rejecting various claims under 35 U.S.C. § 102 and 35 U.S.C. § 103 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. §1.136(a). See 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

pgc

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